REMARKS/ARGUMENTS

As a result of this Amendment, claims 1-15, 20-21, 23, and 26-27 are under active consideration in the subject patent application.

In the Official Action, the Examiner has:

1. acknowledged Applicant's submission of a Request for Continued Examination after final rejection filed September 26, 2008;

2. rejected claim 15 under 35 U.S.C. §112;

3. rejected claims 1, 2, 7, 8, and 23 under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 3,780,767, issued to Borg et al.;

4. rejected claims 1, 3, 6-9, 15, 23, and 24 under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Patent No. 2,020,563, issued to Moore;

5. rejected claims 3-6 and 26 under 35 U.S.C. §103(a) as allegedly being unpatentable over the Borg reference in view of U.S. Patent No. 5,573,029, issued to Freimann;

6. rejected claims 2, 4, 5, and 26 under 35 U.S.C. §103(a) as allegedly being unpatentable over the Moore reference as applied to claim 1 and further in view of the Freimann reference;

7. rejected claims 9-12 under 35 U.S.C. §103(a) as allegedly being unpatentable over the Moore reference in view of U.S. Patent No. 3,170,477, issued to Scott, Jr. et al.;

8. rejected claims 20 and 21 under 35 U.S.C. §103(a) as allegedly being unpatentable over the Borg reference; and

9. rejected claims 20 and 21 under 35 U.S.C. §103(a) as allegedly being unpatentable over the Moore reference.

With regard to Item 1, no response appears necessary.

With regard to Item 2, Applicant has amended claim 15 so as to be dependent from claim 10, thus obviating the antecedents issues raised by the Examiner. Reconsideration is requested of the rejections under 35 U.S.C. §112.

Applicant has also canceled claim 23, and added new claim 27 so as to define further patentable aspects of his condensate trap. In particular, new claim 27 makes clear that the inlet opens into the cylindrical portion of the vortex chamber so as to admit fluid freely into the entire void, but in a tangential direction with respect to the longitudinal axis of the vortex chamber. This structural arrangement thereby promotes a rotational flow of the fluid within the entire void defined by the vortex chamber and about the longitudinal axis. No new matter has been introduced into the application as a result of the introduction of new claim 27.

With regard to Items 3 and 4, Applicant's invention is directed to a "condensate trap". A condensate trap, or steam trap, is a term of the art, and would be well understood by the skilled person as having a specific meaning of a device employed in systems, such as steam systems, for the specific purpose of discharging condensate (water) from the system while preventing, or restricting, the escape of live steam. In one embodiment of the invention, now defined by amended claim 1, Applicant provides a condensate trap that includes a body defining a vortex chamber The body has a circumferential wall and oppositely disposed end walls, such that the vortex chamber

defines a void having a longitudinal axis. An inlet extends within the body and opening at the circumferential wall, that is arranged so as to admit fluid into the chamber in a tangential direction with respect to the longitudinal axis of the vortex chamber. In this way, a rotational flow of the fluid within the vortex chamber is promoted about the longitudinal axis, thereby generating a low pressure region within the fluid that is centered on the longitudinal axis. An outlet is also provided that forms an escape aperture in one of the end walls so as to open into the low pressure region in operation of the condensate trap. As the, inlet opens into the cylindrical portion of the vortex chamber it freely admits the fluid into the entire void, but in a tangential direction with respect to the longitudinal axis of the vortex chamber. This structural arrangement promotes a rotational flow of the fluid within the entire void defined by the vortex chamber and about the longitudinal axis.

Anticipation under 35 U.S.C. §102 requires that each and every element of the invention defined in the claim be met in a single prior art reference. Those elements must either be inherent or disclosed expressly, and must be arranged as described in the claim. See, Diversitech Corporation v. Century Steps, Inc., 850 F. 2d 675, 7 U.S.P.Q. 2d 1315 (Fed. Circuit 1988), Constant v. Advanced Micro-Devices, Inc., 848 F. 2d 1560, 7 U.S.P.Q. 2d 1057 (Fed. Circuit 1988), and Richardson v. Suzuki Motor Company, 868 F. 2d 1226, 9 U.S.P.Q. 2d 913 (Fed. Circuit 1989). Nowhere within the four corners of the Borg or Moore references is there disclosure or even a vague suggestion of a condensate trap suitable for maintaining a pressure during operation. Moreover, the foregoing references fail to teach or suggest an inlet which extends within

the body of a condensate trap, which opens at the circumferential wall of the body, or that freely admits fluid into the entire void, but in a tangential direction with respect to the longitudinal axis of the vortex chamber so as to promote a rotational flow of the fluid within the entire void defined by the vortex chamber and about the longitudinal axis.. These distinctions are quite important for they reflect significant differences between Applicant's claimed structures and the structures taught in either the Borg or Moore references.

More particularly, Borg discloses a "control valve trim cage." The purpose of a trim cage is to provide a rapid pressure reduction with minimum generation of noise. The discharge of a high pressure (and consequently high velocity) flow into the atmosphere is capable of generating significant noise (a whistle functions on this principle), and the purpose of a trim cage is to reduce this noise. Typically, a trim cage or noise reducer, as disclosed by Borg, is fitted to the outlet of a valve through which fluid under pressure is discharged to a lower pressure (for example atmospheric pressure). The skilled person would not consider a trim cage to be a condensate trap, nor would the skilled person consider a trim cage as suitable for use as a condensate trap. The function of a trim cage is to permit a rapid pressure reduction, under all operating conditions, whereas that of a steam trap is to maintain pressure when steam is present at the trap, in order to avoid the loss of live steam. Thus Borg fails to disclose a steam trap. For these reasons, Borg fails to anticipate the subject-matter of claims 1, 2, 7, 8, and 23.

With regard to the Examiner's assertions that claims 1, 3, 6 to 9, 15, 23 and 24

are anticipated by Moore, which has already been considered in the earlier stages of this application, the Examiner is now asserting that the claimed void defined by the vortex chamber is the space in Moore situated above the conical member 27 and below the orifice 16. However, according to Moore, steam and condensate are conveyed to that space along the helical passage 29 defined between the housing 10 and the conical baffle member 27. Importantly, the walls that define helical passage 29 restrict the flow to a specified path, and prevent free flow into the chamber. The steam and condensate thus enter the space at one end of the space only. Claim 1, as amended, specifies that fluid is admitted into the vortex chamber through an inlet which extends within the body and opens at the circumferential wall of the body. Amended claim 24 and new claim 27 make clear that the steam is admitted freely into the entire chamber. This is distinct from the structure taught by Moore (and for that matter Borg) in which the inlet, which can be regarded as the helical passage 29, does not extend within the body, but instead is defined between the body (the housing 10) and the conical baffle member 27 so as to restrict and direct the flow. Applicant requires no such structure. Furthermore, the inlet does not open "at the circumferential wall" of the body (housing 10), but is formed as a gap between the conical baffle member 27 and the inner wall of the housing 10. Consequently, claims 1, as amended, and new claim 27 are patentable over the Moore reference. Claims 3, 6 to 9, and 15 are also not anticipated by Moore, at least through dependency.

With specific reference to claim 24, the fact that hot condensate will flash to steam, if the pressure is sufficiently reduced is, of course, an inherent property of

steam/condensate. However, the Examiner's assertion that "the steam/condensate fluid in Moore would display the same behavior" is without support from within the four corners of that reference. The condensate trap of Moore utilizes a relatively steep spiral gradient in a tube that defines a passage 29 which will open at the space above conical baffle member 27 around a large part of the periphery of baffle member 27. A person of ordinary skill would understand, inherently, that any swirling motion of the fluid as it enters the space above the conical baffle member 27 would be relatively weak and low-energy. Furthermore, on page 3, left-hand column, lines 27 to 33, Moore states:

> "After the condensate flows upwardly through the spiral passage 29 it is forced through the orifice 16 and, as explained above, the hot condensate, or at least a part thereof, flashes into vapor and is discharged into the low pressure chamber 17 as vapor or as a mixture of vapor and condensate."

It is therefore clear that Moore teaches the flashing of the condensate to hot vapor as occurring in, or downstream of, orifice 16, and not in the space above baffle member 27. That space is not referred to in the specification of Moore, and is not taught in that reference as having any material effect on the operation of the device. This is consistent with the understanding among those skilled in the art that the structure of the device of Moore would not create a sufficiently high-energy vortex in the space above baffle member 27 to achieve any flashing of condensate to steam within the space referred to.

Accordingly, the process defined by claim 24 is novel over Moore, and furthermore was not obvious in view of Moore alone or in combination with the other references of record in this case, since Moore states explicitly that flashing to steam occurs later in the travel of the steam/condensate through the device.

Reconsideration and withdrawal of the rejections under 35 U.S.C. §102 are respectfully requested

With regard to Items 5 and 6, the Examiner asserts that claims 3 to 6 and 26 are rejected as unpatentable over Borg et al in view of Freimann (US 5573029). Applicant has amended claim 26 so as to distinguish it from the proposed combination of Borg with Freimann. In order for a prima facie case of obviousness to be established, there must be some suggestion or motivation, either in the reference itself, or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, and the prior art reference must teach or suggest all of the claim limitations [emphasis add] (MPEP §2142). Borg in view of Freimann fails to provide the requisite disclosure, suggestion, or motivation to support the Examiner's rejection of claims 3 to 6 and 26. Reconsideration is requested for the following reasons.

Borg discloses a device having very tiny chambers formed within the thickness of a plate. It is in the nature of the trim cage of Borg that the flow through the device is a high-energy flow, the purpose being to dissipate the energy as rapidly as possible by causing the flow to circulate as a vortex, i.e., Borg teaches the release of pressure, not its maintenance at a particular level.

Freimann is concerned with large-scale devices such as are used in the treatment of waste water in which the swirling flow within the device is of relatively low energy. Borg combined with Freimann, and taken as a whole relate to entirely different technical fields, and it would not occur to the skilled person seeking to modify the device

of Borg to look for the solution in fields such as waste water treatment, if for no other reason than the significant differences in both temperature and pressure associated with these two fields of technology. Furthermore, one purpose of the teaching of Borg is to enable the individual plates 44 (for example, Figure 3) to be made in a relatively simple process, for example by stamping, punching, etc (column 5, lines 40 to 46). It would not be obvious to the skilled person to increase the complexity of manufacture, for no apparent purpose, by adopting a shape for the chambers 47 which is other than cylindrical.

The Examiner also asserts that claims 2, 4, 5 and 26 are rejected as unpatentable over Moore in view of Freimann. The Examiner has previously admitted that Moore fails to disclose a vortex chamber that has a portion that is cylindrical. This was no doubt because Moore fails to teach or suggest any vortex chamber whatsoever. The Examiner continues to mischaracterized Moore's helical passage 29 as a "*vortex chamber,*" so as to equate it with the "vortex chamber" of claims 2, 4, 5 and 26. A person of skill in this art would immediately appreciate that Moore's helical passage 29 cannot be a "chamber" as the expression is used in independent claim 26, and more particularly, cannot be regarded as a "vortex chamber". Those of ordinary skill would understand a "vortex chamber" to be a chamber in which a vortex is generated, i.e., a chamber in which a fluid rotates about its own axis. Moore's helical flow of fluid along passage 29 cannot be regarded as a vortex, nor can Moore's passage 29 itself be considered to be a vortex chamber. Moreover, Moore's helical tube that defines his passage 29 cannot admit fluid freely into an entire void, in a tangential direction with

respect to a longitudinal axis of the chamber defining that void so as to promote a rotational flow of the fluid within said entire void and about said longitudinal axis. Nowhere in Moore is it ever taught or suggested in any way that the fluid rotates in a vortex within passage 29!

Nowhere within the four corners of the Freimann reference is there disclosure, or even a vague suggestion of the structures defined by Applicant's claims 2, 4, and 26. More particularly, Freimann discloses a device with diversion of a pipe flow under pressure with a vertically adjustable built-in part and a swirl chamber which tapers from the region of the tangential inlet to the axial outlet of the flow. Significantly, Freimann is concerned with "*circular tanks, sand classifiers, vortex separators, hydrocyclones or vortex cleaners, centrifugal forced separators, hydrocyclone separators as well as distributor structures for incoming water masses*". A person of ordinary skill would interpret Freimann as relating to the treatment of liquid water in large quantities and at ambient temperatures and pressures. It would not be considered by the skilled person to provide any structures that would be relevant in the art of steam traps. The combination of Moore's condensate removing device in which condensate and vapour enters at an inlet 14 and is discharged through piping 18, after passing through an orifice 16 and a discharge chamber 17 with the structures taught by Freimann fail to teach or suggest all the claim limitations of independent claim 1 and dependent claims 2, and 4.

Moreover, the upwardly tapering conical configuration of Moore would appear to the skilled person to have been deliberately chosen, and consequently it would not be

obvious that a different profile would provide any benefit.

With regard to Items 7-9, Applicant traverses the combination of Moore with Scott, and requests reconsideration for the following reasons. Scott discloses a steam trap of the so-called "thermodynamic" type in which a valve disc 42 is controlled in a manner to open and close the trap according to the condition of steam or condensate in the region above the valve disc. Moore provides a form of orifice trap (using orifice 16), which functions in an entirely different way. There would be no motivation to the skilled person to modify Moore by incorporating a disc such as disclosed in Scott. This would simply provide two steam trapping mechanisms, when only one is required. Furthermore, it is not apparent how the device of Moore could be adapted so as to be accommodated in the space beneath bonnet 38 of Scott. Moore has a relatively complex structure within housing 10, and the skilled person would consider it to be unfeasible to miniaturize that structure to fit into the relatively small space available in Scott. Additionally, housing 10 of Moore already provides a cover over the internal components of the device of Moore, and the skilled person would have no motivation to introduce yet another cover for no apparent purpose.

With regard to the Examiner's rejection of claims 20 and 21 in view of, separately, Borg and Moore, these claims are dependent from claim 1, and allowable at least through dependency.

Reconsideration and withdrawal of the rejections under 35 U.S.C. §103 are respectfully requested

If a telephone conference would be of assistance in advancing prosecution of the above-identified application, Applicants' undersigned Attorney invites the Examiner to telephone him at **215-979-1255**.

Respectfully submitted,

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